THE 9-1-1 ASSOCIATION
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January 5, 1995



Federal Communications Commission
Office of the Secretary
1919 M Street, NW
Washington, D.C. 20554

Re: CC Docket No. 94-102, RM-8143;
FCC 94-237--Revision of the Commission's rules to ensure compatibility with enhanced 9-1-1 emergency calling systems

Dear Commission Members:

As an association of cities, towns and counties in Central Oklahoma that manages a large metropolitan enhanced 9-1-1 system, the 9-1-1 Association of Central Oklahoma Governments is vitally interested in the Commission's recent call for comment regarding PBX and cellular compatibility with enhanced 9-1-1 services. Our 9-1-1 system, established in 1989, serves a six-county region with nearly a million residents and 19 public safety answering points where 9-1-1 calls are answered. We appreciate the opportunity to comment on two very important issues that have concerned us a great deal.

**PBX Switches**

Over the years, call-takers in our system have experienced numerous situations where the PBX switch system has caused confusion and negated efforts to provide efficient emergency response to calls for help. For instance, a person with a medical emergency recently called 9-1-1 from Bank IV branch in Moore, but the call routed to Nichols Hills and the screen showed a Nichols Hills business address of the bank since that is where the telephone switch is located and where they receive their bills from Southwestern Bell Telephone Company. Another example that has plagued local dispatchers would be a call from an elementary school in Midwest City that will show on the call-taker's screen as coming from the Mid-Del Schools Administration Building address, several miles away.

Technological solutions to this problem exist today, but we have had a very difficult time persuading our major local phone company to make those solutions available. We understand that a tariff for "PS9-1-1" has been filed with the Oklahoma Corporation Commission that would allow lease of software enhancements **to be purchased by each individual PBX owner** that would upgrade their switches to delineate more specific station locations by telephone extensions within the switch. It concerns us that this solution is reliant on each business owner with a PBX switch to take responsibility and incur necessary costs to upgrade the switch to make it work in an enhanced 9-1-1 system that is designed to provide address location for each caller. We believe that the telephone company, at a minimum, should identify the location of branch office sites, perhaps leaving responsibility for identifying individual stations within a building up to the business owner.

This is a problem that affects people who rely on 9-1-1 throughout the country, and should be addressed at a national level.

**Cellular Calls**

The challenge of efficiently working with cellular calls is with us in the present; the potentially negative impact on 9-1-1 information posed by ultimate implementation of personal communications services faces our not-too-distant future. We do recognize that several national organizations, including cellular telephone company representatives, have been trying to address this issue but feel that a national directive from the FCC could speed and simplify the process considerably.

There are really two basic issues here: appropriate routing of cellular calls to 9-1-1 and level of location information provided to call-takers. Our 9-1-1 Association has been working with the two area mobile systems companies and Southwestern Bell Telephone for months to provide better routing and handling of calls made from cellular phones to 9-1-1 within our region. In the past, all our region's cellular calls to 9-1-1 were routed to the City of Oklahoma City, which resulted in calls that had to be transferred to other agencies about 50% of the time. The City of Norman now is receiving most of their cellular calls directly rather than through Oklahoma City due to a test arrangement we have made with the telephone companies involved. In fact, a week after the switch, Norman paramedics saved a heart-attack victim's life, who called from his car phone literally on his last breath and gave a local landmark as his location; Norman officials are convinced that had that call routed to Oklahoma City, help would have never found him in time. We have been in a test phase for over six months because the telephone companies have not yet defined what costs may be involved in further progress, nor who will pay if there are additional costs. We had hoped to be redirecting cellular calls in the Midwest City and Edmond areas by this point but have been stymied by the referenced inaction.

The second issue of providing specific location information is more complex, but certainly solvable. This, too, is of national importance as cellular phones become the norm rather than the exception. We would like to encourage the FCC to facilitate discussions among telephone companies and vendors and establish a date certain that a solution and timetable for implementation will be at hand. A good deal of research and reconnaissance work has been done on this issue. Attached as an addendum to this letter is an article that appeared in the November, 1994, "APCO Bulletin" detailing expectations and desires of 9-1-1 call-takers nationwide regarding the cellular issue. We concur with the recommendations therein.

**Summary**

The citizens of this country have invested major amounts of time and money to develop and implement the finest emergency telephone 9-1-1 systems possible. The ability to call one number for any emergency and, without having to be able to communicate, provide the call-taker your location has increased the level of emergency response in this country ten-fold. In hundreds of cases, that location information has made the difference between life and death. We cannot afford to lose this national investment through the back-door of progress. We must meet these challenges at a national level so that progress is really improvement, even in an emergency.

The FCC is to be commended for bringing these two issues to the forefront. We encourage national directive on both the PBX and Cellular situations and stand ready to assist in any way possible.

Sincerely,

Zach D. Taylor
Executive Director

cc: Suzanne Hutchings
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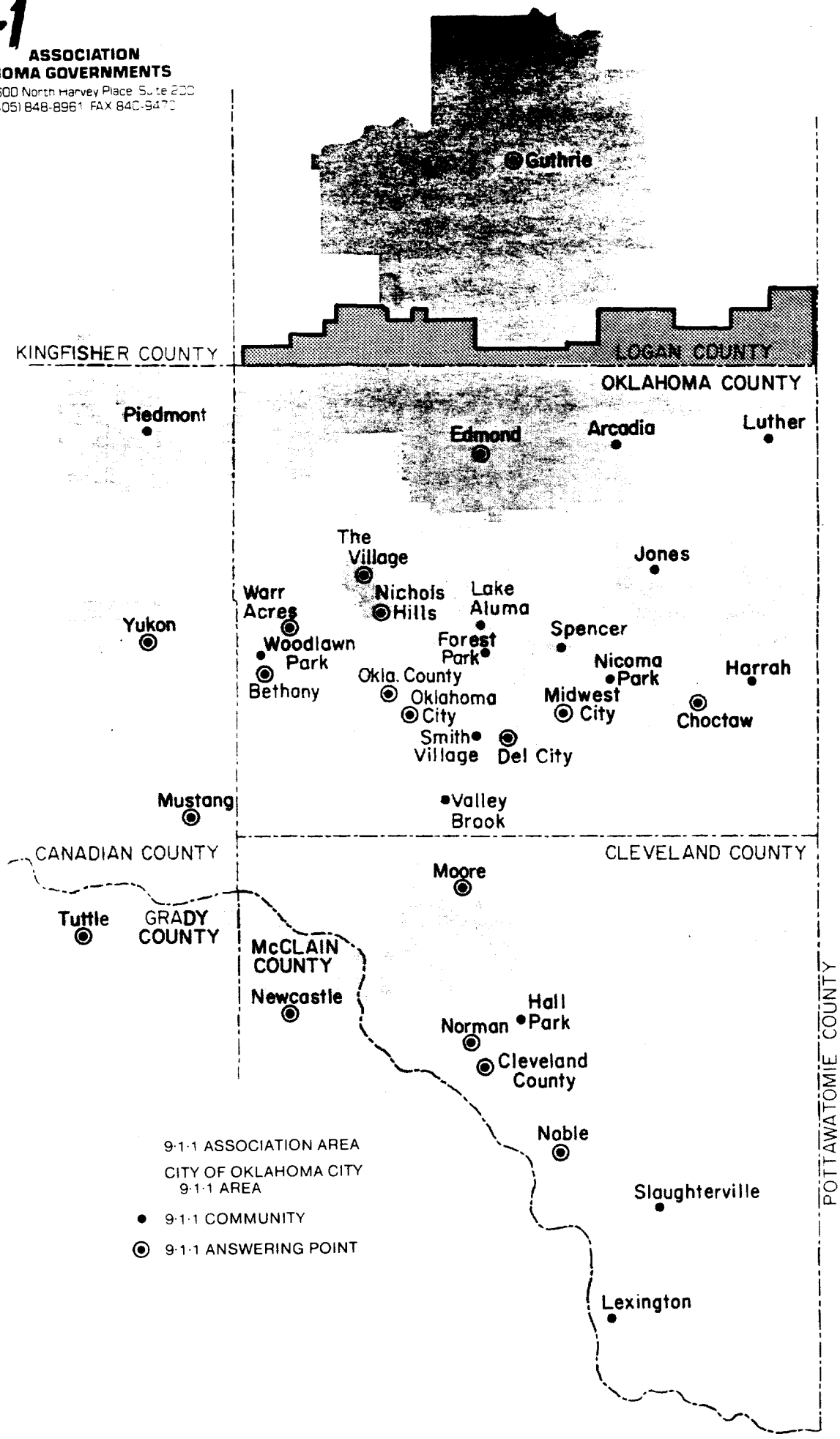

# 101 APCO Members Respond to Survey On PSAP Automatic Location Identification Requirements

*By Mike Celeski*

WIRELESS telephone technologies such as cellular, PCS and satellite are expected to enhance the economics and quality of life throughout the world. As these portable devices become more available to the consumer, a major factor in their purchase decision will be the ability to summon help in times of emergency.

Whether the need is for an ambulance on a Little League ball field, a police officer on a highway, a contingent of firefighters in a national park or a rescue team on the 30th floor of a high-rise, the public will expect to be able to obtain assistance through wireless telephones.

A cooperative effort among the wireline and wireless carriers, the equipment manufacturers and the Public Safety Answering Points (PSAPs) is needed to solve the problems of public safety which will arise as technology advances. We hope that the research described in this article represents an initial step toward that cooperation.

The research was initiated at the NENA Telco/Vendor Conference held in Nashville, Tennessee, this past February. The author participated in the wireless track that considered problems posed to enhanced 9-1-1 by the implementing proliferation of mobile telephone networks, notably PCS.

During the discussion, many ideas were put forth as to how to locate a wireless caller dialing 9-1-1. Many technologies, such as Global Positioning Satellite (GPS) and Radio Directional Finding (RDF) were explored. However, it became apparent that before a method of *how* to locate an emergency caller was chosen, we need to determine *what* information is required by the PSAPs.

In other words, exactly what information does a PSAP call-taker need to determine the location of an emergency. Does the call-taker need to know what floor of a building the caller is on? Does the call-taker need to know how far up a mountain is the rock climber? Are geographic coordinates required to determine the exact location of a farmer in his field who is reporting an accident with his tractor?

**A cooperative effort among the wireline and wireless carriers, the equipment manufacturers and the Public Safety Answering Points (PSAPs) is needed to solve the problems of public safety which will arise as technology advances.**

To answer these types of questions, it was decided to survey the members of NENA and APCO. This article is a report of the results of that survey.

A four-page questionnaire was printed in the June issue of the APCO Bulletin with a letter of explanation by President Steven Proctor, along with a request to APCO's 10,000-plus members to tear it out, answer the questions and mail it in. There were 101 APCO members who returned the survey. The same survey presented to NENA members resulted in 522 responses, for a total of 623.

To the best knowledge of the author/researcher, only one survey was returned by each respondent, meaning no APCO member who sent in the survey also sent another as a NENA member. About 10 more (including some from New Zealand) were received too late for analysis.

Responses were tabulated from 46 states, three Canadian provinces and one other country, Sweden. Of the respondents, 59.15% were PSAP managers or administrators, 16.67% were PSAP supervisors, 14.38% were administrative support personnel and 0.49% were field operations personnel.

***Location Accuracy Requirements***

The questionnaire began with items that were designed to measure how *accurate* location information has to be. Initially, two forced choice questions were given. Respondents were informed that near-term wireless technology may allow only the transmission of either ANI or ALI, but not both. They were then asked to choose between call-back number and approximate location, and call-back number and exact location.

Of the respondents, 85% prefer the caller's exact location, 68% prefer call-back number, 32% prefer the caller's approximate location and 15% prefer the call-back number.

From those figures it is clear that *exact* location information is preferred over a call-back number. However, if only an *approximate* location can be provided (e.g., cell sector), the PSAPs would prefer having a telephone number →

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to call back the complainant. Following up on the previous questions, we asked what constitutes exact location information. The survey item listed specific distances of 100, 220 and 44 yards, plus an open-ended choice of "Varies, but accurate enough to locate the caller within (fill in the time) minutes of (filed unit) arrival."

The responses show that a little more than three-fifths of the persons responding to this question chose the "Variable" answer with an average on-scene caller locating time of 2.36 minutes.

There were 370 who selected "Variable," 185 selected 100 yards, 26 selected 220 yards and 16 selected 440 yards.

For on-scene locating time, 129 listed one minute, 133 listed two minutes, 47 listed three minutes, 14 listed four minutes, 38 listed five minutes, two listed six minutes, one listed seven minutes, one listed eight minutes, two listed 10 minutes and three listed 15 minutes.

***Information Display Parameters***

The survey shows that whatever information is supplied to PSAP call-takers, it must be displayed rather quickly.

Sixty-one percent of the respondents indicated that the location information should be displayed within five seconds of receiving the voice call on 9-1-1.

Only 10% would accept a delay of longer than 10 seconds.

Of the respondents, 377 would accept a delay of five seconds, 176 said 10 seconds, 33 said 20 seconds, 22 said 30 seconds and six said 45 seconds.

These results are understandable when considering that the average duration of an emergency call is about 60 to 70 seconds. That is, within a minute, most PSAP call-takers have to ascertain who is calling, the nature of the emergency and where it is located. This is a monumental task when dealing with excited, frantic callers who can't explain where they are.

Showing how frequently PSAPs desire notification of a mobile caller's changing location, 60.82% respondents asked that dynamic, real-time reporting be provided for those callers who do not stop moving while placing a 9-1-1 call; 26.63% for transmitter hand-offs; and 12.54% for other suggestions.

***Location Information Elements***

Emergency callers are either indoors or outdoors. The elements of information which accurately identify the caller's specific location can thus vary widely.

Indoor callers generally can be identified by a particular street address. However, the street address does not usually state the specific area of the building (e.g., room, floor number, etc.) of the caller. In large complexes (high-rises, campuses, etc.), determining the caller's location takes considerably more effort and time.

For outdoor callers, the location problem becomes even more complex. For example, an outdoor caller may be traveling in an automobile down a specifically named or marked roadway. An outdoor caller may also be working in a particular farm field or construction site. He or she also could be backpacking in the woods or mountains. The advent of telephone services to such "unaddressable" locations will require non-traditional elements of location information.

We, thus, attempted to measure the necessity of several characteristics of outdoor and indoor locations for satisfactory PSAP determination of the caller's location. The first characteristic was the altitude or height at which the caller was located.

The survey showed that for both indoor and outdoor locations this apparently is not a critical element of location description. We underscore the word "apparently" and caution against a quick interpretation of these results.

It is this researcher's belief that the negative skew of responses in these two questions was influenced by the use of the terms "altitude" and "height."

The fact that the vast majority of respondents reported that "altitude" is not a required characteristic of a caller's location does not necessarily mean that they do not need to know where, in a hilly or varied terrain, the caller is located.

Rather, it simply means that they generally have no use for a *display* of a statistic such as "535 feet above sea level."

Furthermore, many respondents crossed out the word "height" and wrote in the word "floor" on the indoor question.

In the survey for outdoor callers, 525 respondents said no to needing the call-

## About the Author

Mike Celeski is vice president of Pertech America, Inc., a public safety systems consulting firm. He assists public safety agencies in designing communication and information management systems. He also assists the manufacturing community in product development and system design. Prior to founding Pertech, Celeski was an industry consultant in the Ameritech Public Safety Group. As the group's senior design project manager, he was responsible for designing turnkey public safety communications systems. While at Ameritech for almost four years, he worked on more than 30 systems in the Midwest, ranging from the Village of Alsip (pop. 17,000) to the City of Chicago (pop. 2.8 million). Before joining Ameritech, he was a sworn officer with the Chicago Police Department. During his 16-year career, he served as a patrol officer, 9-1-1 call-taker and police dispatcher, patrol sergeant, training division sergeant and as the assistant project manager for the department's public safety communications study. That led to his involvement with NENA and APCO. During the Chicago Police Needs Assessment, Mike assisted NENA with the first revisions of the Illinois Emergency Telephone System Act, which enabled public safety agencies to fund many of their current modernization efforts. For APCO, he developed and analyzed the user questionnaires that formed the basis of the Southern Lake Michigan 800 MHz Regional Plan, and he compiled the written draft of the Plan. He continues to assist in drafting proposed 9-1-1 legislative amendments and recently helped compile the Illinois APCO Chapter's comments on the FCC's proposed spectrum refarming. He has a Bachelor's degree in psychology from DePaul University in Chicago and a Diploma in police administration from the Northwestern University Traffic Institute (the "long course").

er's altitude/height and 83 said yes. For indoor callers, 387 said no and 228 said yes.

In urban and suburban areas, addressing schemes are increasingly employing vanity addresses or common place names. Buildings are referred to by "marketable" addresses such as *One IBM Plaza, Two Illinois Center* and the like. While this type of address appears prestigious on a company's letterhead, it offers no location information to a PSAP call-taker.

Therefore, we asked whether the ALI data base should incorporate a common place name field. The response was an overwhelming 94% in favor. When asked whose responsibility it was for maintaining such information, more than half (52%) suggested the 9-1-1 service provider (or telco); 21% thought that the governing jurisdiction ought to maintain the information; 14% believed that this was a responsibility of the PSAP; and about 12% offered other suggestions, consisting primarily of joint responsibility between the telco and the jurisdiction.

Another element not contained in current ALI data bases, but desired by PSAP personnel, is the telephone number of a private security agency on the premises. Eighty-five percent of the respondents voted in favor of including this information in the ALI record. The need for three-way call-bridging with the security agent is less clear. Only 47% requested that call-conferencing with the security agent be included within 9-1-1 service.

The final portion of the survey consisted of four categories of fixed locations. Residential locations were divided into single family, multiple family and transient (hotels, motels, dormitories). Non-residential locations were combined into one category of commercial, office, school or industrial areas.

Tables 1 through 4 below and at right list the mean ratings of the criticality of specific location description elements for each category.

Each element was rated according to the following scale:

1 = "Do Not Provide"

2 = "Not Necessary"

3 = "Desirable"

4 = "Critical to Operations"

We reiterate our caution against premature conclusions about *technical* location terms. The following data show that the technical terms of "latitude/longitude, altitude and state plane coordinates" received the lowest ratings.

However, non-technical terms such as "apartment number, floor number and floor/section area" (which relate to coordinate data) received very high ratings. This supports the argument that PSAP personnel want as much location information as possible, but in a clear, easy-to-understand format. They do not want a display of technical information such as X, Y, Z coordinates.

| SINGLE FAMILY DWELLINGS | AVERAGE (MEAN) RATING |
|---|---|
| Street address (including city, township, etc.) | 3.97 |
| Latitude/Longitude | 2.17 |
| Altitude | 1.94 |
| State Plane Coordinates | 2.01 |
| Location on Lot | 2.81 |

***Table 1***

## Conclusions and Recommendations

Applied research is valuable in as much as it provides decision-makers with a basis for a course of action. Merely reporting the results of a survey provides a limited basis. This author, therefore, has drawn some conclusions from the data and offers the following recommendations.

1. Our first recommendation is that the information contained in this report be used as a contribution in the standards-creation process. This already is beginning to occur. The results of this survey have been accepted by the Telecommunications Industry Association (TIA) at its "Joint Experts Meeting on Public 800 Mobile and Personal Communications Support of 9-1-1 and E-9-1-1 Emergency Services."

2. As the Project 31 Committee becomes more structured, the results of this survey may form the basis of initial consid-

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| MULTIPLE FAMILY DWELLINGS | AVERAGE (MEAN) RATING |
|---|---|
| Street address (including city, township, etc.) | 3.97 |
| Latitude/Longitude | 2.17 |
| Altitude | 2.03 |
| State Plane Coordinates | 2.05 |
| Name of Complex | 3.40 |
| Building/Annex Name or Number | 3.62 |
| Floor Number | 3.62 |
| Apartment Number | 3.89 |

***Table 2***

| HOTELS, MOTELS DORMITORIES | AVERAGE (MEAN) RATING |
|---|---|
| Street address (including city, township, etc.) | 3.96 |
| Latitude/Longitude | 2.17 |
| Altitude | 2.03 |
| State Plane Coordinates | 2.05 |
| Name of Complex | 3.54 |
| Building/Annex Name or Number | 3.64 |
| Floor Number | 3.67 |
| Room Number | 3.86 |

***Table 3***

| COMMERCIAL, OFFICE, SCHOOL or INDUSTRIAL AREAS | AVERAGE (MEAN) RATING |
|---|---|
| Street address (including city, township, etc.) | 3.96 |
| Latitude/Longitude | 2.18 |
| Altitude | 2.02 |
| State Plane Coordinates | 2.06 |
| Name of Complex | 3.56 |
| Building/Annex Name or Number | 3.66 |
| Floor Number | 3.65 |
| Floor Section/Area | 3.56 |
| Room Number | 3.81 |

***Table 4***

## PSAP Automatic Location Identification Requirements ... *From Page 49*

erations by the users' subcommittee. Discussion of this research will provide feedback from personnel currently involved in today's PSAP operations and problems. This feedback could uncover facets of ALI requirements heretofore unimagined. It also will serve to validate or challenge the conclusions made by this researcher.

3. Emergency Caller Location Information must be presented to PSAP personnel in terms that are meaningful, regardless of the technology or technologies employed to provide it. Whether GPS or RDF or some other methods are used to fix an emergency caller's location, such data must not be displayed to call-takers in its raw format (e.g., 35° 16' N, 85° 42' W, 580' ASL). Rather, the data must be translated into an address or perhaps a point on a graphical map display.

4. Description of the caller's location must be displayed as fast as possible, preferably within five seconds of call receipt; certainly no longer than 10 seconds of call receipt.

5. If, in the near future, only ***approximate*** location data can be provided by the wireless industry, providing the caller's mobile telephone number should take precedence. This would include any Roaming access number needing to be dialed. A simpler (for PSAP staff) method of recontacting a complainant would be the provisioning of immediate ring-back capability.

6. Caller location data must be accurate to within 100 yards, or provide at least enough information to allow a responding police, fire, medical unit to locate the incident within two minutes of arrival at the scene of an incident.

7. As time, technology and PSAP requirements progress into the future, the ALI data base should be designed to easily accommodate additional fields of information. Two such fields identified in this survey are common place name and private security agent telephone number. Other fields could include subscriber medical conditions or language preference.

8. The wireless industry should strive to provide dynamic, real-time reporting of a mobile caller's changing location.

9. The provider of 9-1-1 service should assume responsibility for maintaining the ALI data base. Rules should be established to guarantee the cooperation of other telecommunication carrier, public or private, ensuring the accuracy and timeliness of the data.

10. Information about indoor locations should include, at a minimum:

- Complete street address, including city, county and township.
- Floor number on which the caller is located.
- Apartment or room number.
- Any commonly known or used name/number of the caller's building or building complex.
- A specific area or section of a floor which is so expansive as to hinder immediate location of the caller.
- The telephone number of any on-duty security agent on the premises.

11. Some method also will have to be devised to provide as much of the above information with a wireless call made from indoors. ■